Regulation of Virulence in *P. Aeruginosa* by Mechanical Cues

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We explore how bacteria detect and respond to mechanical forces. During the course of an infection, bacteria encounter a variety of mechanical forces such as adhesive forces during contact with the host cells that they infect and shear stresses in fluidic environments. We have developed a biophysical approach using microfluidics and fluorescence lifetime imaging microscopy to explore how bacteria interpret mechanical cues to detect the presence of host cells and to guide the expansion of large bacterial populations within host organisms. In particular, we found that the pathogen *Pseudomonas aeruginosa* detects the presence of hosts using a mechano-sensitive mechanism, akin to a bacterial sense of touch. This response activates virulence and consequently *P. aeruginosa*, unlike other pathogens, relies on mechanical input rather than exclusively on chemical signals for infection. This model provides a long-sought explanation for understanding how *P. aeruginosa* can infect a broad range of hosts including humans, animals and plants. The ubiquity and diversity of mechanical forces in all aspects of a bacterium's life have far-reaching consequences that we are just beginning to comprehend.

Biography:

Dr. Siryaporn received his Ph.D. in Physics and Astronomy at the University of Pennsylvania with Prof. Mark Goulian in 2008 studying cross-talk between signaling networks in bacteria. As a postdoc in the Department of Molecular Biology at Princeton University, he investigated physical mechanisms that regulate the ability of bacteria to infect. He received the NIH Kirschstein NRSA postdoctoral fellowship and the NIH K Career Transition Award for his work. Dr. Siryaporn is currently an assistant professor in the Physics and Astronomy and Molecular Biology and Biochemistry Departments at the University of California, where his lab studies bacterial pathogenesis at the intersection of biophysics and molecular biology.